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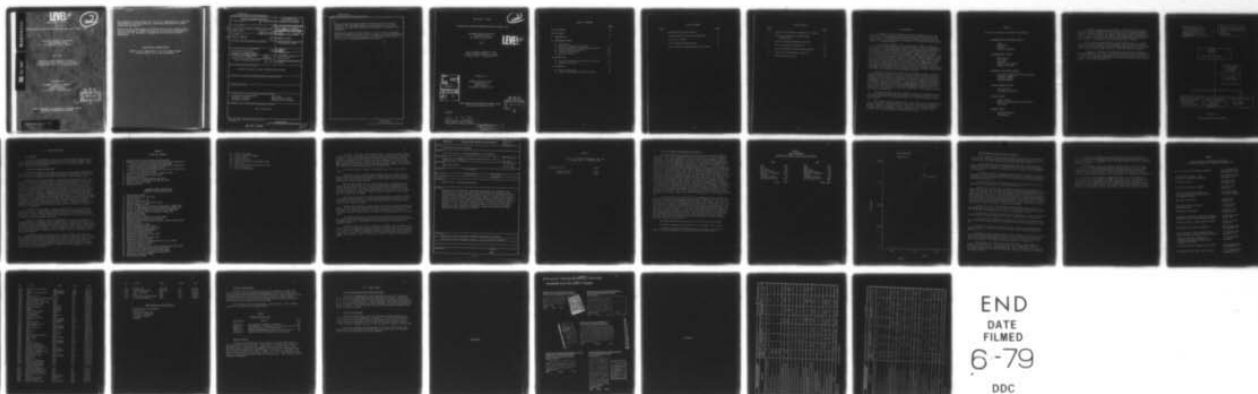
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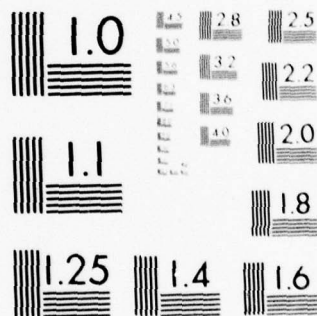
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NONDESTRUCTIVE TESTING INFORMATION ANALYSIS CENTER, 1978

Southwest Research Institute
6220 Culebra Road
San Antonio, Texas 78284

May 1979

Contract Number DLA900-77-C-3733
Annual Technical Report for Period
15 February 1978 - 15 February 1979

Prepared for

DEFENSE LOGISTICS AGENCY
Headquarters
Cameron Station
Alexandria, Virginia 22314

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ARMY MATERIALS AND MECHANICS RESEARCH CENTER
Watertown, Massachusetts 02172

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During the reporting period, NTIAC's computerized data file grew to 15,318 records. The NTIAC Newsletter was distributed to over 4000 recipients. 99 inquiries (technical, bibliographic, and general) were responded to.

Publications included a Critical Review on Liquid Crystals for Nondes- tructive Evaluation and a State of the Art Survey on Automated Radiography. Drafts of a critical review on magnetic leakage methods and a state of the art survey on Barkhausen NDE have been prepared.

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I. INTRODUCTION

On January 6, 1976, by amendment of contract DSA900-74-C-5268, the Department of Defense transferred to Southwest Research Institute full responsibility for operation of the Nondestructive Testing Information Analysis Center (NTIAC), and discontinued the Nondestructive Testing Data Support Center (NTDSC) as a separate function.

From its establishment in 1961, through 1975, NTIAC was operated by the U.S. Army Materials and Mechanics Research Center, Watertown, Massachusetts. In February, 1974, the Department of Defense supplemented the capabilities of NTIAC through a contractor operated support function designated as the Non-destructive Testing Data Support Center (NTDSC). AMMRC continued, however, to bear responsibility as the officially designated DoD information analysis center in the field of nondestructive testing. Accordingly, AMMRC was charged to provide the interface with the NDT community for services of both NTIAC and NTDSC. During the period from February, 1974, to January, 1976, AMMRC worked closely with NTDSC to develop the latter's capability to function independently as a full service information analysis center of technical excellence. A strong relationship between AMMRC and the now fully contractor operated NTIAC continues with AMMRC being designated as the contracting officer's technical representative responsible for technically monitoring NTIAC activities.

Other major provisions of the contract remain substantially unchanged. Southwest Research Institute is charged to operate NTIAC as a full service information analysis center of technical excellence, which includes principally: establishing and continuously maintaining an information support system that is comprehensive and current with respect to the field of nondestructive testing; responding to inquiries for technical or bibliographic information; publication of a current awareness periodical (the NTIAC Newsletter); and, in response to needs of the user community, preparation, publication, and marketing of timely, authoritative critical reviews, technology assessments, state-of-the-art surveys, data books, and handbooks.

In common with other DoD IAC's, NTIAC is required to establish and maintain a service charge system for its products and services with the goal of achieving an annual rate of reimbursement equal to at least 50 percent of yearly direct funding.

The technical scope of NTIAC is that of the entire field of nondestructive testing, inspection, and evaluation--the full range of methods and techniques whereby a material, component, or entire system can be so characterized as to reliably predict its performance under a prescribed service regime. Table 1 indicates major current methods of nondestructive testing.

Table 1

Major Current Methods of Nondestructive Testing

. RADIOGRAPHIC AND RADIOMETRIC TESTING

X-rays
Gamma rays
Neutrons
Filmless techniques

. ELECTROMAGNETIC TESTING

Eddy Currents
RF fields
Microwaves
Magnetic flux analysis
Magnetic particles

. ULTRASONIC AND ACOUSTIC TESTING

Ultrasonic transmission and reflectometry
Ultrasonic imaging
Spectrum analysis
Acoustic emission

. LIQUID PENETRANT TESTING

Dye penetrants
Fluorescent penetrants

. OPTICAL TESTING

Visual testing
Optical reflectometry and transmission
Holography

. THERMAL TESTING

Infrared radiometry
Thermography

The present organization and personnel of NTIAC are shown in Figure 1. By design, NTIAC is supported by the full resources of its host organization, Southwest Research Institute, the organizational chart of which is shown in Figure 2. Of the total Institute Staff of 1600, approximately 200 professional staff constitute the resource of knowledge and expertise which can directly support NTIAC in its publications and information support systems.

In an important respect NTIAC is unique among DoD IAC's. It is the first IAC which was planned from the beginning to rely upon the Defense Documentation Center for automatic data processing (computer) services, as well as certain other essential support services. These are indicated in Figure 3.

In Chapter II the state of development of NTIAC's basic performance areas are summarized. In Chapter III, plans and projections for the sixth year of operation are presented. The Appendices include a copy of the ASNT flyer, and statistical summaries, DSAH Form 1261, for the fourth quarter and cumulative summary, of the fifth contract year.

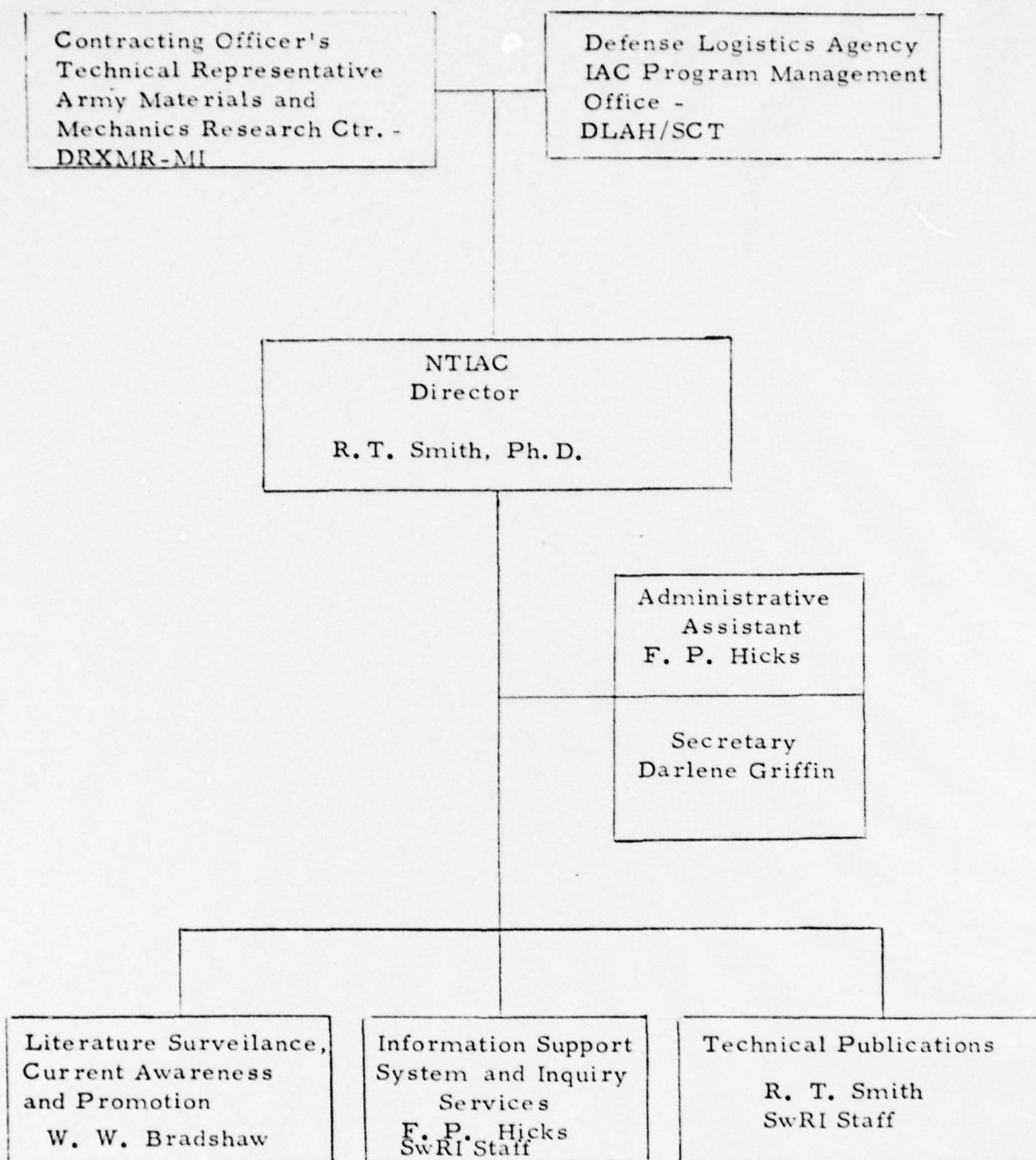
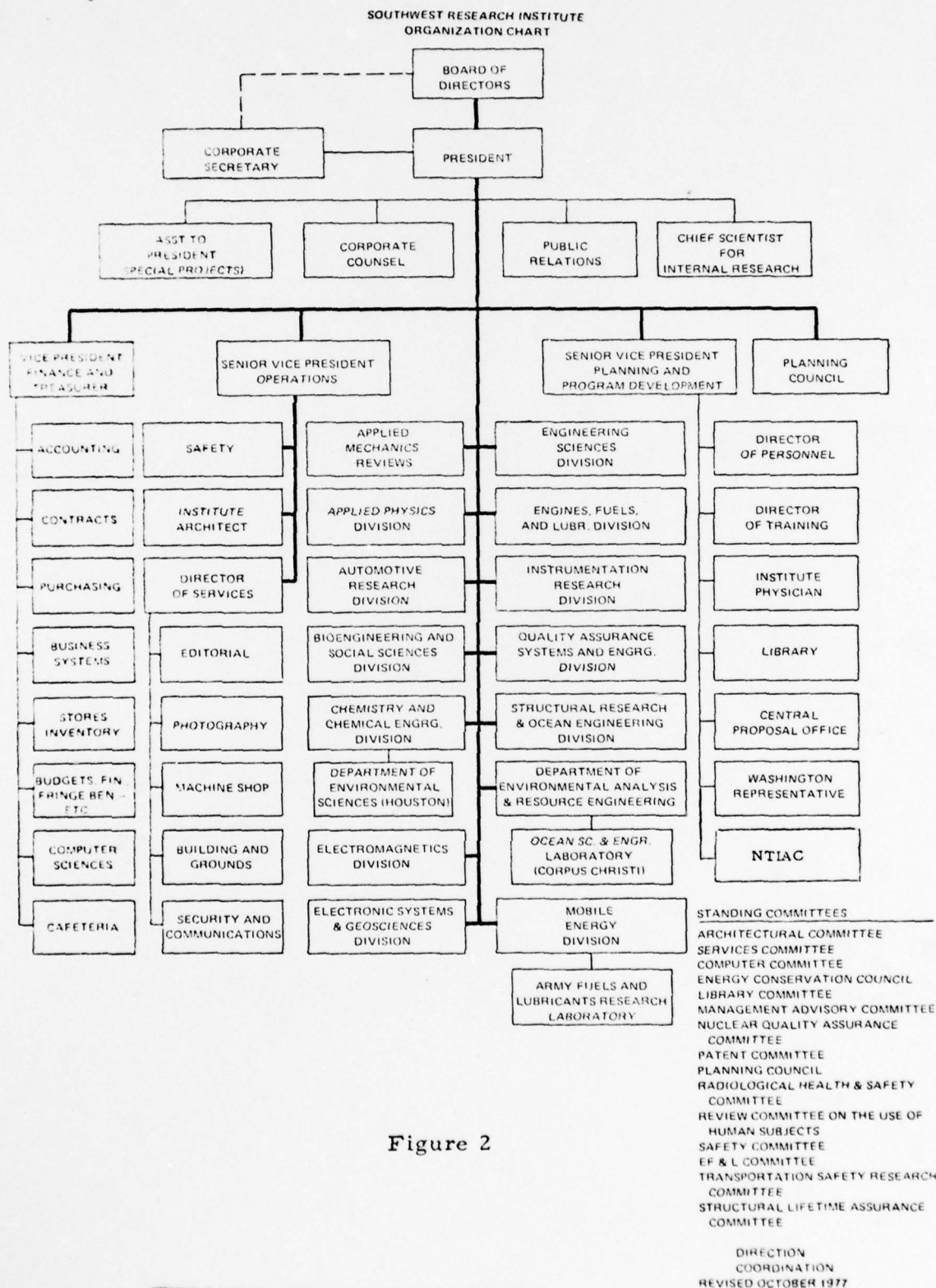


Figure 1

NTIAC Organization and Staffing



DDC
SUPPORT OF
NTIAC

- . RDT&E On-Line System Terminal
- . TR-File; WU-File; R&DPP-File
- . Unique NTIAC File & Inverted (Index) File
- . Batch Input Service
- . Off-Line Print-Out Service
- . Special Output Format
- . Hard Copy Print-Out and Indices of NTIAC File
- . Selected Dissemination of Information Program

Figure 3

II. OPERATIONAL REPORT

A. Introduction

The major areas of NTIAC's activity are: the information support system; current awareness and promotional activities; technical and bibliographic inquiries; technical publications; and special services. The status of each of these areas is reviewed in this chapter.

B. Information Support System (ISS)

NTIAC's ISS comprises a document collection and computerized bibliographic data files. These are kept current through systematic surveillance of the worldwide literature in nondestructive testing and closely allied technical areas.

Surveillance of open literature is accomplished in two basic modes. The most important serial literature, books, conference proceedings, etc., is directly scanned. The "core" literature comprises those serials of which a significant fraction of the contents is ordinarily accessioned. The secondary literature comprises those serials which are also directly reviewed cover to cover, but from which only selected pertinent articles are accessioned. Table 2 lists the current core and secondary serials. As an added check on our surveillance effectiveness, we also scan Current Contents, NASA/SCAN, and the monthly Engineering Index and Science Abstracts. New books, conference proceedings, etc., are surveilled through informal channels, publishers' advertisements and catalogues, and reviews published elsewhere. It is noteworthy that all serial publications, books, proceedings, etc., are furnished to NTIAC by its host institution, Southwest Research Institute, through the Institute's Library, without direct charge. (Exceptions are specific purchases made especially for NTIAC; such items become the property of NTIAC, i.e., of the U.S. Government).

Surveillance of Department of Defense technical reports is accomplished by direct receipt of reports (where NTIAC has been placed on the primary distribution list) and the current awareness service provided by the Defense Documentation Center. A copy (in either ink print or microfiche) of each accessioned report is added to the NTIAC document collection.

Other U.S. Government reports and unpublished private sector reports are surveilled mainly by requesting copies through informal contacts with agencies and individuals engaged in nondestructive testing programs. Additionally, commercially available "dial up" bibliographic data files (mainly the NTIS file) are periodically searched for NDE related citations. This gives good coverage of publicly released U. S. Government reports, especially those of NASA, which are comparatively rich in the area of NDE.

Southwest Research Institute utilizes a General Electric "Terminet 30" data communications terminal with remote batch print-out capability. This terminal is shared by the SwRI Library and NTIAC and is located in the NTIAC offices along with the DDC terminal and printer, making the overall operation convenient and efficacious. The use of this equipment for broader periodic searches of commercially available computerized data bases further ensures the adequacy of NTIAC's surveillance of the literature.

Table 2

NTIAC CORE JOURNALS

1. British Journal of Non-Destructive Testing (GB)
2. Institute of Electronics and Electrical Engineers, Transactions
Acoustics, Speech, and Signal Processing (USA)
3. Institute of Electronics and Electrical Engineers, Transactions
Instrumentation and Measurement (USA)
4. Institute of Electronics and Electrical Engineers, Transactions
Sonics and Ultrasonics (USA)
5. Journal of the Acoustical Society of America (USA)
6. Journal of Testing and Evaluation (USA)
7. Materialprüfung (Ger.)
8. Non-Destructive Testing International (GB)
9. Soviet Journal of Nondestructive Testing (USSR)
10. Materials Evaluation (USA)
11. Ultrasonics (GB)

SECONDARY SERIAL PUBLICATIONS
SURVEILED AND REVIEWED BY NTIAC

1. ASEA Journal (Sweden)
2. ASTM Standardization News (USA)
3. Acustica (Ger.)
4. Aircraft Engineering (GB)
5. American Ceramic Society Bulletin (USA)
6. American Laboratory (USA)
7. Journal of Engineering for Power, Transactions of ASME (USA)
8. Journal of Engineering Materials and Technology, ASME (USA)
9. Journal of Applied Mechanics, Transactions of ASME (USA)
10. Journal of Pressure Vessel Technology of ASME (USA)
11. Applied Optics (USA)
12. Applied Physics (USA)
13. Automated Control & Computer Sciences (USSR)
14. The Bell System Technical Journal (USA)
15. Canadian Aeronautics and Space Institute Transactions (Canada)
16. Composites (GB)
17. Control Engineering (USA)
18. Defense Management Journal (USA)
19. Electro-Optical Systems Design (USA)
20. Electro-Mechanical Design (USA)
21. Electronic Engineering (GB)
22. Engineering Fracture Mechanics (USA)
23. Engineering Index (USA)
24. European Scientific Notes (GB, ONR)
25. Experimental Mechanics (USA)
26. IEEE Transactions on Instrumentation and control (USA)
27. Industrial Laboratory (USSR)
28. Industrial Research (USA)
29. Industrial Electronics and Control Instrumentation IEEE (USA)
30. Instruments and Experimental Techniques (USSR)
31. International Journal of Fracture (Netherlands)
32. Materials Science and Engineering (Switzerland)
33. Measurement Techniques (USSR)
34. Metal Progress (USA)

35. Nuclear News (USA)
36. Optical Engineering (USA)
37. Quality (USA)
38. RCA Review (USA)
39. Review of Scientific Instruments (USA)
40. SAMPE (USA)
41. Science Abstracts, Sections A & B (GB)
42. Wear (Netherlands)
43. Welding Journal (USA)

For each of the items accessioned by NTIAC, a computerized bibliographic record is created. Each such record comprises the pertinent fields, illustrated in Figure 4. Index terms (descriptors) are taken from a controlled word list prepared by NTIAC; this list is updated at least semiannually. In those cases where a bibliographic record already exists in the Technical Report file at DDC, NTIAC augments the DDC record by adding the NTIAC accession number and descriptors, thus effectively bringing such records into the NTIAC file.

The current status of NTIAC's bibliographic data file is presented in Table 3.

In addition to its own unique bibliographic data file, NTIAC also has access, through its RDT&E on-line terminal, to DDC's Technical Report (based on DD Form 1473), the Work Unit File (based on DD Form 1498), and the R&D Program Planning File (based on DD Form 1634).

We are still looking forward to DDC's capability of furnishing all the indexes with our NTIAC bibs. We are now receiving indexes with DDC bibs and with our DAB printouts. Receipt of indexes with bibs from our NTIAC file was a high-priority item on our requested enhancements to the system. DDC reports that this capability is under development. Early availability of these indexes will be of great value to NTIAC.

Since the second quarter of this reporting period, our efforts have been considerably limited because of problems with the peripheral equipment at DDC. The on-line system was returned to full time operation only at the end of this contract year, February 15, 1979.

The DDC annual meeting for RDT&E users in October was attended by Frances Hicks. At this meeting DDC requested that RDT&E users act as a group rather than individually in requesting services from DDC, enhancements to the system, etc. Len Fisher, Lawrence Livermore Labs, was chosen as the representative of the users group.

The Regional Conference in February was also attended by Frances Hicks. This meeting was devoted almost entirely to explanations of searching the WU (1498) and R&DPP (1634) files. The R&DPP file became accessible to contractors on January 19, 1979.

The ISS continues to receive cooperation from DDC. More "limited-distribution" reports are appearing with the "Form 55 not needed" notation. This enables us to order the document via the RDT&E terminal at a considerably reduced expenditure of time. Also, DDC is requesting that the limitations be removed on the abstracts when possible. This too results in a savings in both time and money for NTIAC.

NTIAC

LITERATURE REVIEW WORKSHEET

(42) NT-10959
(1) AD-D301672

(6) Title Nuclear Resonances in Metals		
(10) Authors I. D. Weisman, L. J. Swartzendruber, L. H. Bennett		
(12) Availability Published in Techniques of Metals Research; Vol. 1, Pt. 2; 1973; Chapter 2; 165-504	(33) Code: 1, 21 (43) Copy: 1	
(21) Sup. Note: See also NT-3281	(11) Date: 1973 (12) No. pp: 340	
(35) Source Code:	(14) Source Series:	
(15) Contract	(18) Mon. Acronym:	(19) Mon. Series:
(9) Descr. Note:	(34) Serial Descr.:	
(30) Annotation: Authoritative. Advanced discussion.		
(27) Abstract: A general review of theory, experimental apparatus and technique, and representative results of nuclear resonances in metals. Covers continuous-wave and pulsed NMR, nuclear quadrupole resonance (NQR), NMR in ferromagnetic materials (FNR), the Mossbauer effect, and combined resonances (the Overhauser effect), acoustic modulation of Mossbauer spectra, nuclear magnetic acoustic resonance, helicon waves, and electron-nucleus double resonance. Also discussed are thermal effects, sample size and shape effects, diffusion, spurious resonances, calorimetric detection of NMR, and NMR in superconductors. (NTIAC)		
(44) Descriptors: *Nuclear magnetic resonance, *Nuclear quadrupole resonance, *Mossbauer effect, test book, reviews, acoustic nuclear resonance		
Other key words:		
Date Input:		
Indexer:		

Figure 4

Table 3

Status of the NTIAC Bibliographic Data Base
15 February 1978 - 15 February 1979

Documents in file	15,318
Complete records	12,515
Partial records	2,803

C. Current Awareness and Promotional Activities

The NTIAC Newsletter continues to be well received by the NDT community. The January 1978 issue, featuring a digest of a report on a circular ultrasonic transducer array, was referenced in a recent issue of Science Trends, a weekly publication of current awareness in science in this country, several months after the publication of the transducer array article. This reference sparked several inquiries to NTIAC requesting more information on this array. The March 1978 issue featured the second article, prepared by Don Forney, Jr., Chief, Nondestructive Evaluation Branch, Air Force Materials Laboratory, Wright-Patterson AFB, Ohio, on NDE at a Government agency. This article outlined the NDE Research and Development Activity in the U.S. Air Force. The May 1978 issue featured a digest of a report on a rather new NDT method called the "Krypton Exposure Technique" in which radioactive krypton is allowed to permeate surface flaws in the test specimen; by autoradiography of the permeated specimen extremely fine flaws are revealed. The June 1978 issue featured a short report on a method, which although over thirty years old, nondestructive strain sensing with brittle coatings offers a simple, inexpensive means to map surface strains. The July 1978 NTIAC Newsletter reviewed a newer method of using neutrons from Californium-252 for radiography. The detection and mapping of residual stresses in metallic specimens was covered by articles in the April, September, and November 1978 issues. (Residual stresses are very important in structural parts; it is necessary to know if the stresses in a shaft are sufficiently high to impact the required strength without also producing brittleness.)

The article by Prof. Gerald Gardner on the NTIAC-sponsored conference on "The Role of Education in Nondestructive Evaluation" prompted letters to the editor which were published in the December 1978 and January 1979 issues. At least one more such letter remains to be published in a later issue. The December 1978 issue also featured an article on the NDI Reliability Workshop sponsored by the U.S. Air Force for both Government and industrial personnel involved in nondestructive inspection of aircraft structures. This issue also featured an article authored by one of our readers. In fact, the past twelve months has produced more responses from readers than the previous two years. This December issue also demonstrated that the NTIAC Newsletter does get world-wide circulation--the local contact, Mr. Bernie Boisvert, of the San Antonio Air Logistics Center reported numerous inquiries from all over the globe.

The NTIAC Newsletter circulations held fairly constant during 1978.

Circulations are given for November 1977 and November 1978 in Table 4.

The overall growth in the NTIAC Newsletter circulation is plotted in Figure 5, showing the change in circulation from 1976 to the present.

Table 4
NTIAC NEWSLETTER
Breakdown According to Service As Of November

	<u>1978</u>		<u>1977</u>
Army	180	Army	194
Navy	211	Navy	207
Air Force	178	Air Force	178
DoD Non-Service	65	DoD Non-Service	64
Other U.S. Government	167	Other U.S. Government	170
Foreign	167	Foreign	166
Foreign Government	53	Foreign Government	53
U.S. Private Sector	<u>3115</u>	U.S. Private Sector	<u>2629</u>
TOTAL	4136	TOTAL	3661

NTIAC NEWSLETTER
MAILING LIST

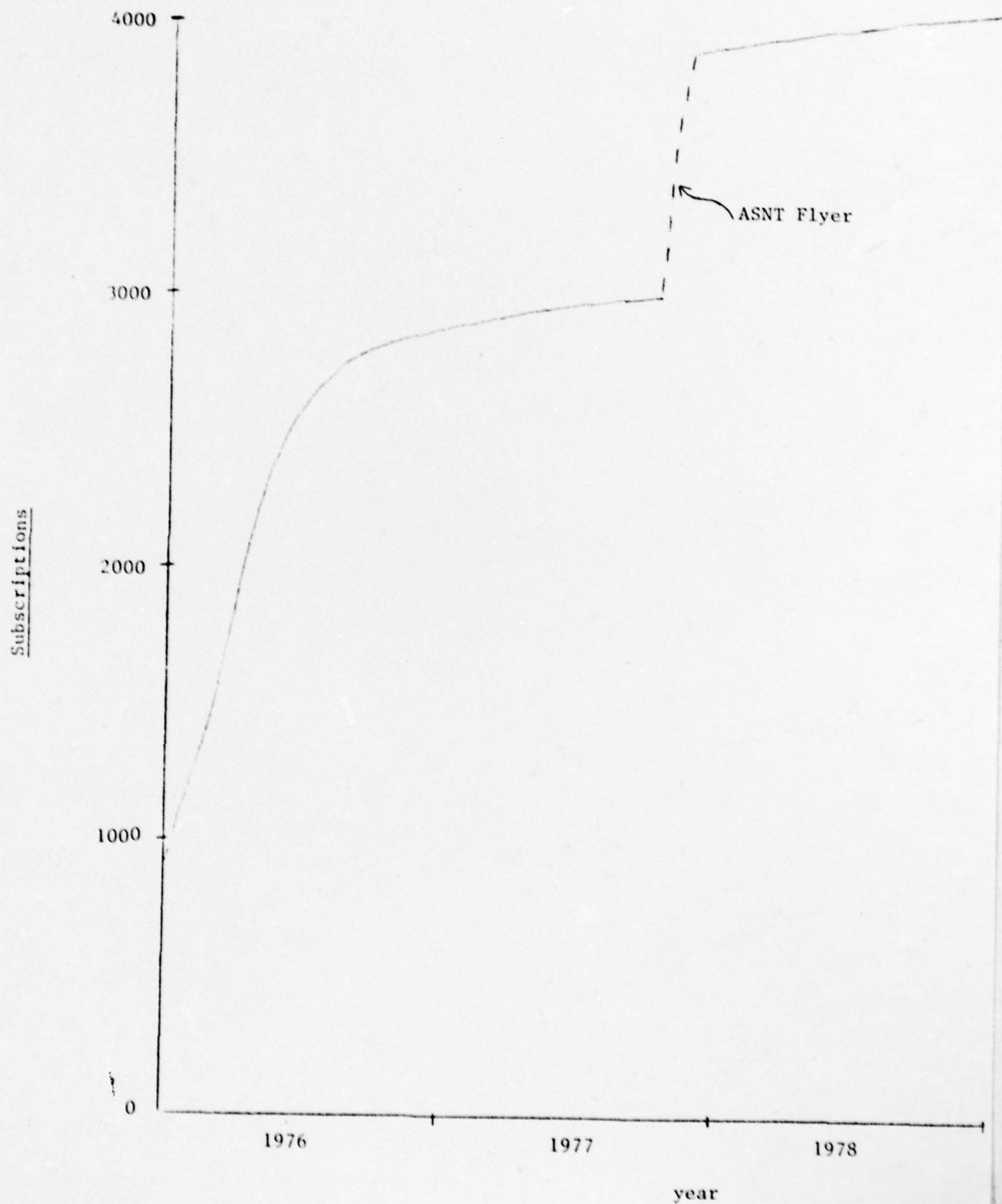


Figure 5

Current Awareness and Promotional Activities

Table 5 summarizes NTIAC current awareness participation and promotional briefings and displays at various conferences and meetings during the past year. We have also included the two DDC Users Conferences in this listing.

At Salt Lake City, Utah, during February 13-15, Dr. Smith attended the Second International Conference on Nondestructive Evaluation in Nuclear Industry, jointly sponsored by the ASNT, the American Society for Metals, and the American Nuclear Society.

On Tuesday, February 21 through Thursday, February 23, NTIAC, in cooperation with the other materials-oriented IAC's, sponsored a promotional booth at the 1978 Materials Technology Conference, held at the Institute for Defense Analysis Auditorium, Arlington, VA.

Dr. Smith attended the 1978 Spring Conference of the American Society for Nondestructive Testing, April 3-5, held at New Orleans, LA.

On April 6 and 7, NTIAC was represented at the briefing of Directors of Information Analysis Centers, sponsored by the Army Materials and Mechanics Research Center, in Watertown, MA. The briefing included short presentations by Dr. J. J. Burke, Associate Director for Plans and Programs, and Col. W. R. Benoit, Commander/Deputy Director of the Center. Mr. Ray Farrow then gave a detailed presentation of the manufacturing methods technology program, and Mr. A. Tarpinian gave a presentation of the battlefield systems integration program. The second session, on April 7, was concerned with discussion of current services provided by the IAC's and steps which would be taken by the IAC's to support new programs.

On April 11-14, Dr. Smith attended the Third International Conference on Automated Inspection Product Control, held at the University of Nottingham, England. Dr. Smith served as Chairman of the session on computing and control.

On May 8-10, NTIAC had a booth at the First Inspection, Testing, and Quality Assurance Show, held by the American Society for Quality Control at Chicago, IL.

During July 17-21, NTIAC was represented by Dr. Smith at the Rockwell/AFML Conference on Quantitative NDE, held at Scripps Institute of Oceanography, La Jolla, CA.

On August 2-4, NTIAC was represented by Dr. Smith at the NDI Reliability Workshop, sponsored by the U.S. Air Force, and held at the Shamrock Hilton Hotel, Houston, TX.

On August 13-18, at Franklin Pierce College, Rindge, N.H., NTIAC, in cooperation with the Engineering Foundation Conference and the American Society for Nondestructive Testing, sponsored a conference on "The Role of Education in Nondestructive Evaluation." Dr. Smith was General Chairman of the conference.

During October 2-5, NTIAC had a promotional booth at the Fall ASNT Conference held at Denver, CO. Dr. Smith attended the ASTM Symposium on NDE for Composites, October 10-11, at Philadelphia, PA. Later, on November 6-9, at Chicago, IL., NTIAC co-sponsored the Fourth International Conference on Automotive Inspection and Process Control.

The Mechanical Failures Prevention Group held its Annual Symposium on Detection, Diagnosis and Prognosis for System Applications at the Oak Hills Motor Inn, San Antonio, TX., on November 28-30. Dr. Smith attended this local conference representing NTIAC.

NTIAC continues to get fine support from ASNT in the area of our publications. Two of these reports have recently been advertised in a flyer by ASNT. A reproduction of this flyer showing the Electromagnetic-Acoustic-Transducers, A State-of-the-Art Survey, by R. E. Beissner, and Advanced Ultrasonic Testing Systems, A State-of-the-Art Survey, by H. Stan Silvus, are illustrated in Appendix A.

During the year visitors to NTIAC included Mr. J. L. Blue of DLA, Mr. George Darcy and Mr. Sam Valencia of AMMRC, Mr. Malcolm Perry of Rolls-Royce Ltd., England, Mr. James Wingfield and Mr. Mark Leimbeck of Illinois Tech Research Institute, Mr. Roy Sharpe, Director of the Harwell NDT Centre, England, Mr. George Pherigo, Director of Education for ASNT, and Dr. Noboru Niwa, Professor of Engineering at the University of Tokyo, and member of the International NDE Committee.

Table 5

Current Awareness and Promotional Meetings
For Period 15 February 1978 through 15 February 1979

NDE for Nuclear Power Industry Conference	13-15 February 1978 Salt Lake City, UT.
IAC Promotional Exhibit. IDA Conference on Materials Technology	21-23 February 1978 Washington, D. C.
ASNT Annual Meeting	3-5 April 1978 New Orleans, LA.
IAC Directors Briefing by AMMRC	6-7 April 1978 Boston, MA.
Third International Conference on Automated Inspection & Product Control, Co-sponsored by NTIAC	11-14 April 1978 Nottingham, ENGLAND
ASQC Show; NTIAC booth	8-10 May 1978 Chicago, IL.
Rockwell/AFML Annual Review of Quantitative NDE	17-21 July 1978 La Jolla, CA.
NDI Reliability Workshop	2-4 August 1978 Houston, TX.
Conference on The Role of Education in NDE, Sponsored by NTIAC and Engineering Foundation	13-18 August 1978 Rindge, N.H.
ASNT Fall Meeting; NTIAC promotional booth	2-5 October 1978 Denver, CO
ASTM Symposium on NDE for Composites	10-11 October 1978 Philadelphia, PA.
Annual Meeting at DDC for RDT&E Terminal Users (Information Support System, F. Hicks)	17-20 October 1978 Washington, D.C.
Fourth International Conference on Automated Inspection & Product Control, Co-sponsored by NTIAC	6-9 November 1978 Chicago, IL.
Mechanical Failures Prevention Group Conf.	28-30 November 1978 San Antonio, TX.
DDC Regional Users Conf. (ISS, F. Hicks)	13-15 February 1979 Albuquerque, N.M.

D. Inquiries and Special Services

NTIAC responded to 99 inquiries during the reporting period, 15 February 1978 to 15 February 1979. Table 6 summarizes inquiry activity for this period.

Twenty-one bibliographies were delivered at a total charge of \$3,780. This figure represents the amount billed during this period. The dollar amount on Form 1261 for Item 3, Bibliographic Inquiries, shows income actually received. (The income from the DAB subscriptions is also reported in Item 3). Of these bibliographies, only four were for Government agencies. Four bibliographies were delivered at no charge.

In October we performed a demonstration for personnel from Kelly AFB. At their request, we agreed to perform this demonstration without charge.

We received 11 inquiries for technical information and 53 for general or cost information. Of the informational responses, 7 were for Government agencies.

As in past reporting periods, charges continue to be the primary deterrent to greater utilization of NTIAC by Government agencies, except for Super Inquiries. Thus, continued growth in this service area depends primarily upon response of the commercial, industrial, and academic user community.

Table 6

Technical and Bibliographic Inquiries
15 February 1978 - 15 February 1979

No.	Source	Type	Amt.	Date
0317	Vogt Machinery Co.	Bibliography	\$100	2/17/78
0318	Small Business Admin.	Tech Inquiry	n/c	2/22/78
0319	Enirex Corp.	Info	n/c	2/22/78
0320	SwRI	Bibliography	\$155	3/8/78
0321	KB-Aerotech	Bibliography	\$110	3/13/78
0322	Endevco	Tech Info	n/c	3/15/78
0323	Cedillos Testing Co.	Info	n/c	3/13/78
0324	Arthur D. Little Co.	Proposal	n/c	3/17/78
0325	Rock Island Arsenal	Bibliography	\$315	3/21/78
0326	SwRI	Info	n/c	3/22/78
0327	DLA (Kirschner)	Info	n/c	3/23/78
0328	Westinghouse Electric	Proposal	n/c	3/15/78
0329	Lucas Industries	Info	n/c	3/15/78
0330	IIT Research Institute	Info	n/c	4/3/78
0331	SwRI	Bibliography	\$410	5/3/78
0332	R. Pickett, Cambridge, MA	Proposal	n/c	4/10/78
0333	SwRI	Bibliography	\$110	4/14/78
0334	John Hill, Boston, MA	Tech Info	n/c	4/18/78
0335	NBS	Bibliography	\$50	4/19/78
0336	SwRI	Bibliography	\$130	4/19/78
0337	SwRI	Preliminary Search (See 0388)	n/c	5/4/78
0338	SwRI	Bibliography	\$130	5/19/78
0339	Battelle Columbus	(See 0340)	n/c	5/24/78
0340	Battelle Columbus	Bibliography	\$150	5/24/78
0341	NBS	Bibliography	\$100	5/29/78
0342	Naval Research Lab	Tech Info	n/c	5/25/78
0343	SwRI	Bibliography	\$195	6/19/78
0344	Acme-Cleveland Devel. Co.	Info	n/c	6/19/78
0345	Solar Energy Res. Inst.	Info	n/c	6/19/78
0346	Mech. Eng. Inst.	Info	n/c	6/19/78
0347	University of Houston	Info	n/c	6/22/78
0348	SwRI (NTIAC)	Bibliography	n/c	6/22/78
0349	SwRI (NTIAC)	Bibliography	n/c	6/23/78
0350	Chicago Bridge & Iron	Info	n/c	6/27/78
0351	Physical Acoustics Corp.	Tech Info	n/c	6/30/78
0352	University of California	Info	n/c	6/27/78
0353	Wyman-Gordon	Info	n/c	6/28/78
0354	Vetco Services	Info	n/c	7/7/78
0355	Westinghouse	Info	n/c	7/7/78
0356	Lucius Pitkin Co.	Info	n/c	7/17/78
0357	TFI Corp.	Info	n/c	7/31/78
0358	Naval Ordnance Station	Info	n/c	7/31/78
0359	Bharat Heavy Electricals	Info	n/c	7/31/78

No.	Source	Type	Amt.	Date
0360	University of Michigan	Info	n/c	8/2/78
0361	SwRI	Bibliography	\$130	8/11/78
0362	Oak Ridge National Lab	Bibliography	\$490	9/5/78
0363	TFI	Info	n/c	8/9/78
0364	Franklin Inst.	Info	n/c	8/10/78
0365	India- Dept. of Atomic Energy	Info	n/c	8/14/78
0366	Circle Chemical Co.	Info	n/c	8/18/78
0367	Howard Heffan, California	Info	n/c	8/18/78
0368	NDT Labs, Michigan	Info	n/c	8/21/78
0369	Stanford Res. Inst.	Proposal	n/c	9/5/78
0370	Martin Marietta	Tech Info	n/c	9/5/78
0371	AMMRC	Proposal	n/c	9/5/78
0372	TRW Defense & Space	Proposal	n/c	9/7/78
0373	General Dynamics	Info	n/c	9/15/78
0374	Westinghouse	Proposal	n/c	9/18/78
0375	Industrial Park	Info	n/c	9/26/78
0376	Con Edison of N.Y.	Bibliography	\$155	9/26/78
0377	SwRI	Bibliography	\$140	9/29/78
0378	Warner-Lambert	Tech Info	n/c	10/2/78
0379	Sprague Electric Co.	Info	n/c	10/5/78
0380	SwRI (NTIAC)	Bibliography	n/c	11/21/78
0381	Coors Porcelain	Bibliography	\$135	10/6/78
0382	SwRI	Info	n/c	10/17/78
0383	Kelly AFB	Tech Info	n/c	10/17/78
0384	PA Inc.	Proposal	n/c	10/19/78
0385	Floating Point Systems	Info	n/c	10/19/78
0386	SwRI (NTIAC)	Bibliography	n/c	10/25/78
0387	Dimes, Inc.	Info	n/c	10/26/78
0388	SwRI	Bibliography	\$170	10/27/78
0389	Reluxtrol Co.	Bibliography	\$345	10/31/78
0390	Dresser Industries	Info	n/c	11/2/78
0391	Argonne National Lab	Info	n/c	11/13/78
0392	Owensby & Kritikos, Inc.	Tech Info	n/c	11/13/78
0393	Precision Castparts	Bibliography	\$230	11/16/78
0394	Atomergic Chemetals Corp.	Tech Info	n/c	11/17/78
0395	OSC America, Inc.	Info	n/c	11/21/78
0396	Drexel University	Bibliography	\$230	11/21/78
0397	NASA-Lewis	Info	n/c	11/21/78
0398	Hydril Co.	Info	n/c	11/21/78
0399	Perslin, Washington	Info	n/c	12/7/78
0400	Yuma Proving Ground	Info	n/c	12/11/78
0401	Sacramento Municipal Utility District	Info	n/c	12/19/78
0402	Precision Castparts	Info	n/c	12/19/78
0403	Magnetic Analysis Corp.	Info	n/c	1/2/79
0404	Air Products & Chem.	Info	n/c	1/2/79
0405	Nuclear Regulatory Com.	Info	n/c	1/4/79
0406	Battelle	Bibliography	\$100	1/11/79
0407	Times Wire & Cable	Proposal	n/c	1/17/79
0408	General Dynamics	Info	n/c	1/30/79
0409	Daniel Groteke, Ohio	Bibliography	\$100	2/12/79

No.	Source	Type	Amt.	Date
0410	Bremshey AG	Proposal	n/c	2/13/79
0411	Howmet Turbine Corp.	Tech Info	n/c	2/13/79
0412	Hardy Associates	Info	n/c	2/15/79
0413	SwRI	Info	n/c	2/19/79
0414	Information Clearing House	Info	n/c	2/22/79
0415	Hybon Engineering Co.	Info	n/c	2/22/79

Subscriptions to the NTIAC DAB

National Bureau of Standards
KB-Aerotech
Lawrence Livermore Lab
University of Michigan
Ford Motor Company
ARRADCOM

E. Technical Publications

NTIAC has issued a Critical Review on Liquid Crystals for NDE, and a State-of-the-Art Survey on Automated Radiography. We have also prepared and obtained approval for publication of the NTIAC Handbook, a state-of-the-art survey on Barkhausen methods, and a critical review of magnetic leakage methods. A critical review on certification and accreditation has been under preparation, along with a critical review on eddy current NDE.

Our Publications have been enjoying a good acceptance by the technical community as is shown by the following Table 7.

Table 7

1978 Publication Sales

<u>Publication</u>	<u>Title</u>	<u>Sales</u>
NTIAC-76-1	Electromagnetic Acoustic Transducers	201
NTIAC-76-2	Proceedings of a Workshop on NDE of Residual Stress	209
NTIAC-77-1	Advanced Ultrasonic Testing Systems	162
NTIAC-78-1	Automated Radiography, A State of the Art Survey	16
NTIAC-78-2	Liquid Crystals for Nondestructive Evaluation	3

F. Special Services

During this year NTIAC has been successful in selling three super inquiries totaling \$66,900 in income. (This income is included under "Other" in Form DSAH 1261). One of these is a state-of-the-art survey of NDE for Army Aviation Composite Materials, for AVRADCOM. The second is a technology assessment of optical techniques for NDE, for AMMRC. The third is an analysis of the expected data-gathering effectiveness and efficacy of the Army CIBLE bearing inspection system for T-700 engine shaft bearing inspection. This analysis is being sponsored by AVRADCOM.

III. FUTURE PLANS

A. Current Awareness and Promotional Activities

NTIAC will be represented at the Spring ASNT meeting to be held in San Diego, and the Fall General ASNT meeting to be held at St. Louis. NTIAC will also be actively participating in the 12th Symposium on Nondestructive Evaluation to be held at San Antonio in April. Under consideration for NTIAC representation are the International Conference on Acoustic Emission, and the British NDT Society Annual Conference. Later in the year we plan to attend the Annual Rockwell Conference on Quantitative NDE.

B. Products and Services

During the coming year we shall be publishing the NTIAC Handbook, the state-of-the art survey on Barkhausen techniques, a critical review on magnetic leakage methods, the critical review on eddy currents, the critical review on certification and accreditation, and two additional state-of-the-art surveys. We shall propose to publish one state-of-the-art survey on composite material NDE.

We plan to continue offering our DAB to our users, and will have under consideration other prepackaged bibliographies on selected topics of unusually wide interest and importance to the user community.

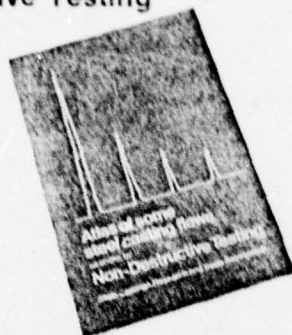
APPENDICES

Available from the ASNT Catalog

Atlas of Some Steel Casting Flaws As Shown by Nondestructive Testing

This important book describes typical castings flaws and discusses their detection by ultrasonics. Published by the Steel Castings Research and Trade Association of England. 36 pages, 1969.

#328 \$6.00 10 oz.

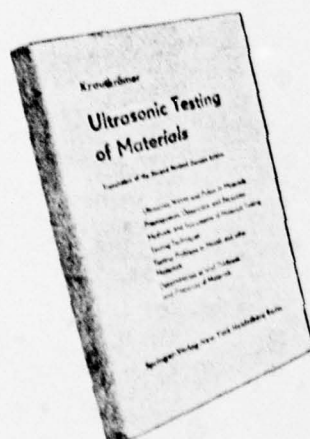
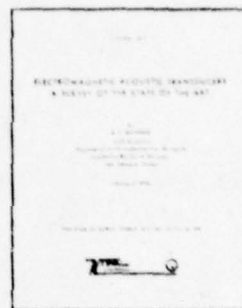


Electromagnetic-Acoustic Transducers: A Survey of the State of the Art

by R.E. Beissner

Published by NTIAC, the book examines the principles of ultrasonic wave generation and detection of acoustic waves as they relate to electromagnetic-acoustic transducer design. It also examines potential applications, such as flaw detection, thickness measurements, and metallurgical characterization. 52 pages, 1976.

#755 \$13.00 10 oz.



Ultrasonic Testing of Materials

by Drs. Josef and Herbert Krautkramer

Like its successful first edition, this revision is intended for technicians and engineers in the field of materials technology; quality control departments in the metal industry; universities and institutes for metallurgical research; and authorities responsible for material testing. Included in the second edition are a number of new topics. The section on applications discusses in detail virtually all engineering test problems that have been successfully tackled with ultrasonic methods. 668 pages, 1977 (2nd ed.).

#324 \$66.00 50 oz.

Procedures and Recommendations for the Ultrasonic Testing of Butt Welds

Published by the Institute of Welding, London, England

Reprinted in the United States by Krautkramer Ultrasonics, Inc., this is an extensive revision and amplification of a book first published in 1965. Testers at all levels are offered authoritative and immediately usable information written in simple language.

42 pages, 1972.

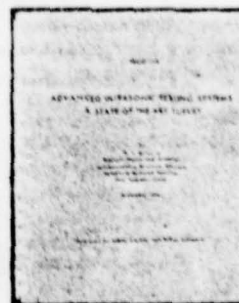
#327 \$14.00 12 oz.

Advanced Ultrasonic Testing Systems: A State-of-the-Art Survey

by H.S. Silvis, Jr.

This publication gives a practical overview of the types of ultrasonic nondestructive inspection apparatus presently in use and of the relatively new techniques which are being applied to improve the capabilities of such systems. The survey includes discussions on automated ultrasonic inspection systems for a variety of applications and signal processing techniques as applied to ultrasonic inspection. Published by the Nondestructive Testing Information Analysis Center (NTIAC). Illustrated. 76 pages, 1977.

#330 \$20.00 12 oz.



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APPENDIX B

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT		NAME OF INFORMATION ANALYSIS CENTER Nondestructive Testing Information Analysis Ctr				QUARTER ENDING Feb. 15, 1979		CUMULATIVE THRU	
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED			TOTAL	COSTS INCURRED			INCOME
		PRO FESSIONAL	NON-PRO FESSIONAL			DIRECT	INDIRECT	TOTAL	
1. ACQUISITION AND INPUT OF SOURCE INFORMATION		203	228.5		431.5	4060	4724	8784	
a. DOCUMENTS ACQUIRED	580								
b. DOCUMENTS REVIEWED	565								
c. DOCUMENTS CATALOGED	365								
2. TECHNICAL INQUIRY RESPONSES PROVIDED	1	--	1		1	(119)	12	(107)	130
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	16	2	13		15	(307)	350	43	1825
4. HANDBOOKS/ DATA BOOKS COMPLETED		--	--		--	--	--	--	--
a. NEW CHAPTERS/PAGES COMPLETED	--								
b. REVISED CHAPTERS/PAGES COMPLETED	--								
c. DATA SETS COMPILED	--								
5. STATE-OF-THE-ART STUDIES COMPLETED	--	--	--		--	(549)	1	(548)	559
a. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	--	--	--		--	(71)	--	(71)	128
7. CURRENT AWARENESS AND PROMOTION EFFORTS		96.5	55		151.5	2162	1399	3561	--
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	12,450								
b. NUMBER MEETINGS CONFERENCES, ETC SUPPORTED	16								
8. OTHER		684	16		700	12,377	15,989	28,366	
9. MANAGEMENT AND SUPPORT		--	89		89	1,095	916	2,011	
10. UNASSIGNABLE INDIRECT COSTS		--	--		--	--	--	--	
11. TOTAL		985.5	402.5		1388	18,648	23,390	42,039	2642

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INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT		NAME OF INFORMATION ANALYSIS CENTER Nondestructive Testing Information Analysis Ctr				QUARTER ENDING		CUMULATIVE THRU Feb. 15, 1979	
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED		TOTAL	COSTS INCURRED		TOTAL	INCOME	
		PRO FESSIONAL	NON-PRO FESSIONAL		DIRECT	INDIRECT			
1. ACQUISITION AND INPUT OF SOURCE INFORMATION		886	1169.5	2055.5	26,798	34,143	60,941		
a. DOCUMENTS ACQUIRED	2653								
b. DOCUMENTS REVIEWED	2087								
c. DOCUMENTS CATALOGED	1834								
2. TECHNICAL INQUIRY RESPONSES PROVIDED	11	--	7	7	(1688)	85	(1603)	1757	
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	74	3	180	183	(1534)	2459	925	6124	
4. HANDBOOKS/DATA BOOKS COMPLETED		248.5	403.5	652	6646	8576	15,222	--	
a. NEW CHAPTERS/PAGES COMPLETED	--								
b. REVISED CHAPTERS/PAGES COMPLETED	--								
c. DATA SETS COMPILED	--								
5. STATE-OF-THE-ART STUDIES COMPLETED	1	433	162	595	7706	12,478	20,184	2289	
6. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	1	420	244	664	9319	11,918	21,237	674	
7. CURRENT AWARENESS AND PROMOTION EFFORTS		1696.5	669.5	2366	41,730	41,315	83,045	--	
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	49,391								
b. NUMBER MEETINGS, CONFERENCES, ETC. SUPPORTED	29								
8. OTHER		684	16	700	12,167	15,989	28,156	67,110	
9. MANAGEMENT AND SUPPORT		353	966	1319	16,377	19,969	36,346		
10. UNASSIGNABLE INDIRECT COSTS		--	--	--	--	--	--		
11. TOTAL		4724	3817.5	8541.5	117,521	146,932	264,453	77,954	